STATE OF HAWAII

TITLE 12 DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

SUBTITLE 8 DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

CHAPTER 223

HEATING BOILERS

Historical Note: Chapter 223 of title 12 is based on chapter 377 of the Hawaii Occupational Safety and Health Standards, Rules and Regulations. [Eff. 7/11/74; am 12/30/76; am 8/1/78; R 12/6/82]

§12-223-1 Standard heating boilers. The maximum allowable working pressure of standard heating boilers shall in no case exceed the pressure indicated by the manufacturer's identification stamped or cast on the boiler or on a plate secured to it. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-2 Safety valves for steam boilers. (a) Each steam boiler shall have one or more ASME and National Board certified safety valves of the spring pop-type adjusted and sealed to discharge at a pressure not to exceed 15 psig. Seals shall be attached in a manner to prevent the valve from being taken apart without breaking the seal. The safety valves shall be arranged so that they cannot be reset to relieve at a higher pressure than the maximum allowable working pressure of the boiler.

(b) No safety valve for a steam boiler shall be smaller than 3/4 inches unless the boiler and radiating surfaces consist of a

self-contained unit. No safety valve shall be larger than 4-1/2 inches. The inlet opening shall have an inside diameter equal to, or greater than, the seat diameter.

(c) The total minimum relieving capacity of the valve or valves shall be governed by the capacity marking on the boiler. Table 221-1 in section 12-221-5 may be used to determine the required total capacity.

(d) No valve of any description shall be placed between the safety-relief valve and the boiler, nor on the discharge pipe between the safety-relief valve and the atmosphere. The discharge pipe shall be at least full size and fitted with an open drain to prevent water lodging in the upper part of the safety-relief valve or in the discharge pipe. Sectional areas of a discharge pipe shall not be less than the full area of the valve outlets discharging thereinto, and the discharge pipe shall be as short and straight as possible and so arranged as to avoid stresses on the valve or valves. When an elbow is placed on the safety-relief valve discharge pipe, it shall be located close to the safety-relief valve outlet; or the discharge pipe shall be securely anchored and supported. When the umbrella or drip pan type of connection is used, the discharge piping shall be so designed as to prevent binding due to expansion. All safety-relief valve discharges shall be so located or piped as not to endanger persons working in the area. [Eff. 12/6/82; am 12/19/83; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-3 Safety-relief valve requirements for hot water boilers. (a) Each hot water heating boiler or hot water supply boiler shall have at least one ASME and National Board certified safety-relief valve of the automatic reseating type set to relieve at or below the maximum allowable working pressure of the boiler.

(b) No valve of any description shall be placed between the safety-relief valve and the boiler, nor on the discharge pipe between the safety-relief valve and the atmosphere. The discharge pipe shall be at least full size and fitted with an open drain to prevent water lodging in the upper part of the safety-relief valve or in the discharge pipe. When an elbow is placed on the safety-relief valve discharge pipe, it shall be located close to the safety-relief valve outlet; or the discharge pipe shall be securely anchored and supported. All safety-relief valve discharges shall be so located or piped as not to endanger persons working in the area. [Eff. 12/6/82; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-4 Steam gages. Each steam boiler shall have a steam gage connected to its steam space, water column, or steam connection, by means of a siphon or an equivalent device exterior to the boiler. The scale on the dial of a steam gage shall be graduated to not less than 30 psig or more than 60 psig. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-5 Pressure or altitude gages and thermometers. **(a)** Each hot water boiler shall have a pressure or altitude gage connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler except by a cock with tee or lever handle placed on the pipe near the gage. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

(b) The scale on the dial of the pressure or altitude gage shall be graduated approximately to not less than 1-1/2 nor more than 3 times the maximum allowable working pressure.

(c) Piping or tubing for pressure or altitude gage connections shall be of nonferrous metal when smaller than 1-inch pipe size.

(d) Each hot water boiler shall have a thermometer so located and connected that it shall be easily readable when observing the water pressure or altitude gage. The thermometer shall be so located that it will at all times indicate the temperature in degrees Fahrenheit of the water in the boiler at or near the outlet.

(e) A combination pressure-temperature gage may be used in place of a separate pressure gage and thermometer provided it is located as required in subsection (d) above. [Eff. 12/6/82; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-6 Water gage glasses. Each steam boiler shall have one or more water gage glasses attached to the water column or boiler by means of valved fittings. The lower fitting shall be provided with a drain valve or the straightway type with an opening not less than 1/4-inch diameter to facilitate cleaning. Gauge glass replacement shall be possible while the boiler is under pressure. Transparent material, other than glass, may be used for the water gage provided that the material has proved suitable for the pressure, temperature, and corrosive conditions encountered in service. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-7 Automatic low water fuel cutoff or water feeding device. (a) General Requirements for Water Level Controls for Low-Pressure Steam or Vapor Systems Boilers.

(1) Each low-water fuel cutoff or combined feeder/cutoff device shall conform to the Standard for Limit Controls, UL 353, and shall be accepted by a nationally-recognized testing agency.

(2) Installation diagrams and instructions shall be furnished by the manufacturer.

(3) Low-water fuel cutoffs or combined feeder/cutoff devices shall be located to provide access for servicing, repairing, testing, and inspection.

(4) The low-water fuel cutoff shall have a pressure rating at least equal to the set pressure of the safety valve or

safety-relief valve.

(5) In probe-type, low-water cutoffs, an open circuit failure, break, or disconnection of the electrical components or conductors in the safety circuit shall prevent continued operation of the firing mechanism.

(6) Alarms, when used, shall be distinctly audible above the ambient noise level, and may be used in conjunction with indicating lights. They shall be located to alert the operator, or an individual trained as to what action to take when an alarm indicates a potentially dangerous situation is developing.

(b) Requirements for Water Level Controls for Low-Pressure for Steam or Vapor System Boilers.

(1) Each automatically-fired, low-pressure steam or vapor system boiler shall have at least two automatic low-water fuel cutoffs, one of which may be a combined feeder/cutoff device. Each device shall be attached to the boiler by a separate pipe connection. Each cutoff device shall be installed to prevent startup and to cut off the boiler fuel supply automatically, prior to the fall of the surface of the water below the level of the lowest visible part of the gage glass (see also (a)). A water feeding device, when used, shall be constructed and installed so that the water inlet valve cannot feed water into the boiler through the float chamber or its connections to the boiler. The water feeding device shall be located to maintain the operating water level.

(2) The electrical circuit shall be connected in such a manner that either low-water fuel cutoff control will shut off the fuel supply to the boiler when a low-water condition develops. One cutoff control shall be set to function ahead of the other. Functioning of the lower of the two cutoff controls shall cause a safety shutdown (lockout) requiring manual reset. The manual reset may be incorporated in the lower cutoff control, or may be effected remotely. Where a reset device is separate or remote from the low-water cutoff, a means shall be provided to indicate actuation of the low-water cutoff. The manual rest device may be the instantaneous type, or may include a time delay of not more than 3 minutes after the fuel has been cut off.

(3) The fuel cutoff device may be inserted internally or attached externally to the boiler. An external cutoff device may be attached to piping connecting a water column to the boiler or combined with a water column. Water column piping and connections shall be at least 1 inch NPS. If the lower water fuel cutoff is connected to the

boiler by pipe or fittings, no shutoff valves of any type shall be placed in such piping. A cross, or equivalent fitting, shall be placed in the water piping connection at every right angle to facilitate cleaning and inspection. Fuel cutoff devices embodying a separate chamber shall have a vertical drain-pipe and a blowoff valve, not less than 3/4 inch NPS, located at the lowest point of the chamber or water-equalizing pipe connections so that the chamber and the equalizing pipe can be flushed and the device tested.

(4) A low-water fuel cutoff or combined feeder/cutoff device may also be installed in the tapped openings available for attaching a water gage glass directly to a boiler, provided the connections are made to the boiler with nonferrous tees or wyes not less than 1/2 inch NPS between the boiler and the water gage glass so that the water gage glass is attached directly and as close as possible to the boiler; the run of the tee or wye shall take the water glass fitting, and the side outlet or branch of the tee or wye shall take the low-water fuel cutoff or combined feeder/cutoff device. The ends of all nipples shall be hollowed to full-size diameter.

(5) A system may incorporate a time-delay component with the low-water fuel cutoff device to prevent short cycling. This component shall not constrict any connecting piping, and the time delay shall not exceed the boiler manufacturer's recommended timing or 90 seconds, whichever is less. The device shall cut off the fuel supply when the water falls to the lowest visible part of the gage glass. [Eff. 12/6/82; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-8 Feedwater connections. (a) Feedwater, make-up water, or water treatment shall be introduced into a boiler through the return piping system or through an independent feedwater connection which does not discharge against parts of the boiler exposed to direct radiant heat from the fire. Feedwater, make-up water, or water treatment shall not be introduced through openings or connections provided for inspection or cleaning, safety valves, safety relief valves, surface blowoff, water columns, water-gage glasses, pressure gages, or temperature gages.

(b) Feedwater pipe shall be provided with a check valve near the boiler and a stop valve or cock between the check valve and the boiler or return pipe system. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-9 Check valves and vacuum breakers. Each hot water boiler or bank of hot water boilers having common cold water supply

piping shall be equipped with a check valve ahead of the stop valve unless the supply piping is so installed as to prevent emptying of the boiler in case of failure of the supply-water pressure. This may be accomplished by installing a vacuum breaker in the supply piping at a point higher than the hot water boiler. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-10 Repairs and renewals of fittings and appliances. Whenever repairs are made to fittings or appliances, or it becomes necessary to replace them, the work must comply with the requirements for new installations. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-11 Clearances. Clearances around hot water supply or heating boilers shall not be less than:

(1) Three feet on the side with operating controls;
(2) Eighteen inches between the boiler and the adjacent walls or other structures;
(3) Three feet between the top of the boiler proper and the lowest obstruction located above (i.e., beams, piping, ceiling etc.); and
(4) Five feet opposite any manhole. [Eff. 12/8/86; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-12 Stop valves. (a) Stop valves in the outlet, inlet, and return-pipe connections shall be installed as near the boiler nozzle as practicable.

(b) The minimum pressure rating of all valves or cocks shall be at least equal to the pressure stamped on the boiler; and the temperature setting of such valves or cocks, including all internal components, shall be not less than 250° F (121.1° C). [Eff. and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-13 Drain valves. All low-pressure steam boilers and low-pressure steam cookers shall be fitted with valves or cocks connecting to the lowest water-containing spaces. The minimum size of the drain piping, valves, and cocks shall be 3/4 inch. The discharge piping shall be full size to the point of discharge. [Eff. and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-223-14 Controls and safety devices. The requirements of controls and safety devices for automatically fired boilers shall apply. [Eff 7/6/98] (Auth: HRS §397-4) (Imp: HRS §397-4)